Yakeen NEET 2.0 2026

Physics by MR Sir

Basic Maths and Calculus (Mathematical Tools)

Assignment-01
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1. Two waves are represented by the equation $y_1 = a \sin(\omega t + kx + 0.57)$m and $y_2 = a \cos(\omega t + kx)$m, where x is in meter and t in sec. The phase difference between them is

(1) 1.0 radian

(2) 1.25 radian

(3) 1.57 radian

(4) 0.57 radian

2. The phase difference between two waves, represented by:

$y_1 = 10^{-6} \sin\{100t + (x/50) + 0.5\}$m

$y_2 = 10^{-6} \cos\{100t + (x/50)\}$m,

where x is expressed in metres and t is expressed in seconds, is approximately: **[MR*] [2004]**

[Hint: Phase difference = Angle of difference]

(1) 2.07 radians (2) 0.5 radians

(3) 1.5 radians (4) 1.07 radians

3. Find value of cos (120°), sin (150°) and tan (135°) are

(1) $-\frac{\sqrt{3}}{20}, \frac{1}{2}, 1$ (2) $\frac{\sqrt{3}}{2}, -\frac{\sqrt{3}}{2}, -1$

(3) $-\frac{1}{2}, \frac{1}{2}, -1$ (4) $-\frac{1}{2}, \frac{\sqrt{3}}{2}, 1$

4. $\sqrt{1+\cos\theta}$ is equal to

(1) $\sqrt{2}\sin\frac{\theta}{2}$ (2) $\sqrt{2}\cos\frac{\theta}{2}$

(3) $\frac{1}{\sqrt{2}}\sin\frac{\theta}{2}$ (4) $\frac{1}{\sqrt{2}}\cos\frac{\theta}{2}$

5. If $\frac{\sqrt{I_1}+\sqrt{I_2}}{\sqrt{I_1}-\sqrt{I_2}} = \frac{5}{3}$, then find $\frac{I_1}{I_2}$.

6. $\sqrt{1-\sin\theta}$ is equal to

(1) $(\sin\theta + \cos\theta)$

(2) $(\sin\theta - \cos\theta)$

(3) $\sin\frac{\theta}{2} + \cos\frac{\theta}{2}$

(4) $\sin\frac{\theta}{2} - \cos\frac{\theta}{2}$

7. A person, at any instant finds angle of elevation of 40 m high building as 30°. After some time the angle of elevation becomes 60°, then value of distance, the person moved towards the building will be:

(1) $d = \frac{40}{\sqrt{3}}$ (2) $d = \frac{80}{\sqrt{3}}$

(3) $d = \frac{60}{\sqrt{3}}$ (4) $d = \frac{120}{\sqrt{3}}$

8. Find value of tan (3°)

(1) 3° (2) sin (3°)

(3) $\frac{\pi}{60}$ rad (4) Both (2) and (3)

9. If $y = 4 \sin\theta \cdot \cos\theta$ then find value y_{max} and angle at which y will be maximum.

10. If $A + B + C = m$ and $A : B : C = 2 : 3 : 1$, find value of B.

11. If $y = 4 - 2\cos\theta$ then find maximum and minimum value of y.

12. The amplitude of a S.H.M. reduces to 1/3 in first 20 sec, then in first 40 sec. its amplitude becomes:

[Hint: $A = A_0 e^{-kt}$] **[MR*] [1999]**

(1) $\frac{1}{3}$ (2) $\frac{1}{9}$

(3) $\frac{1}{27}$ (4) $\frac{1}{\sqrt{3}}$

13. A nucleus of mass number 189 splits into two nuclei having mass number 125 and 64. The ratio of radius of two daughter nuclei respective is: **[2022]**

[Hint: $R \alpha A^{y_3}$; Area $\alpha R \alpha A^{2/3}$ Volume $\alpha R^3 \alpha A$]

(1) 25 : 16 (2) 1 : 1

(3) 4 : 5 (4) 5 : 4

14. Find value of $0.25\sqrt{0.49} \times (0.2)^2$

15. A wire of length '*l*' and resistance 100 Ω is divided into 10 equal parts. The first 5 parts are connected in series while the next 5 parts are connected in parallel. The two combinations are again connected in series. The resistance of this final combination is: **[JEE-2025]**

(1) 55 Ω

(2) 60 Ω

(3) 26 Ω

(4) 52 Ω

16. $\frac{1}{x^3\sqrt{x}} = x^n$, find value on *n*?

17. Object of mass 20 kg is breaks into 3 part in the mass ratio 1 : 2 : 5 then find mass of smallest and largest part?

18. Two slits in Young's experiment have widths in the ratio 1 : 25. The ratio of intensity at the maxima and minima in the interference pattern, $\frac{I_{max}}{I_{min}}$ is:

$$\left[\text{Hint: } \frac{I_{max}}{I_{min}} = \left(\frac{\sqrt{I_1}+\sqrt{I_2}}{\sqrt{I_1}+\sqrt{I_2}}\right)^2\right]$$ **[2015 Re]**

(1) 4/9 (2) 9/4

(3) 12/149 (4) 49/121

19. Ramlal and Pinky buy pizza of same thickness and radius 10 cm and 15 cm respectively in 50 and 100 rupees who is smatter?

20. The interference pattern is obtained with two coherent light sources of intensity ratio *n*. In the interference pattern, the ratio $\frac{I_{max}-I_{min}}{I_{max}+I_{min}}$ will be:

$$\left[\text{Hint: } I_{max} = \left(\sqrt{I_1}+\sqrt{I_2}\right)^2,\ I_{min} = \left(\sqrt{I_1}-\sqrt{I_2}\right)^2\right]$$

(1) $\frac{\sqrt{n}}{(n+1)^2}$ (2) $\frac{2\sqrt{n}}{(n+1)^2}$

(3) $\frac{\sqrt{n}}{n+1}$ (4) $\frac{2\sqrt{n}}{n+1}$

21. A bob is whirled in a horizontal plane by means of a string with an initial speed of ω rpm. The tension in the string is *T*. If speed becomes 2ω white keeping the same radius, the tension in the string becomes:

[Hint: Tension $\propto \omega^2$] **[JEE Main 2025]**

(1) *T*/4 (2) $\sqrt{2}T$

(3) *T* (4) 4*T*

22. $210\sqrt{2} \times 2 \times \pi \times 50 \times 10 \times 10^{-6} = ?$

(1) 0.93 (2) 1.20

(3) 0.35 (4) 0.58

23. In an ideal transformer, the turns ratio is N_P/N_S = 1/2. The ratio V_S : V_P is equal to (the symbols carry their usual meaning): **[NEET-2024]**

$$\left[\text{Hint: } \frac{V_S}{V_P} = \frac{N_S}{N_P}\right]$$

(1) 1 : 2 (2) 2 : 1

(3) 1 : 1 (4) 1 : 4

24. The magnetic field at a distance *r* from a long wire carrying current *i* is 0.4 tesla. The magnetic field at a distance 2*r* is **[1992]**

$$\left[\text{Hint: } B\alpha\frac{1}{r}\right]$$

(1) 0.2 tesla (2) 0.8 tesla

(3) 0.1 tesla (4) 1.6 tesla

25. Let T_1 and T_2 be the energy of an electron in the first and second excited states of hydrogen atom, respectively. According to the Bohr's model of an atom, the ratio $T_1 : T_2$ is: **[2022]**

$\left[\text{Hint: } T\,(\text{energy}) \alpha \frac{1}{n^2}\right]$

(1) 9 : 4 (2) 1 : 4

(3) 4 : 1 (4) 4 : 9

26. If mass of object 12 kg divided in three part in ratio 1 : 2 : 3 then find mass of each part.

27. Spring of length L and spring constant K divided into ratio 3 : 2, then new spring constant of bigger part.

28. If n-identical sphere of radius r combine to form a bigger sphere then radius of bigger sphere.

29. If wire of length L is bended into a arc of angle θ then find radius of arc.

30. Solve this following expression:

$0.07 \times 2\pi \times 4.5 \times 10^{-2}$ N

(1) 198 N

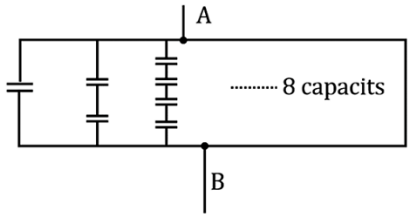
(2) 19.8 mN

(3) 99 N

(4) 1.98 mN

31. A rod of length L converted into circle of n-turns then find radius of circle.

32. Find equivalent capacitance between A and B.



(1) $2C$

(2) $C/2$

(3) C

(4) infinite

33. **Assertion (A):** Geometric progression is a type of sequence where each successive term is produced by multiplying each preceding term by common ratio

Reason (R): Sum of G.P. series is given by $\frac{1^{st}\text{ term}}{1-\text{ C.R.}}$ for any value of C.R. [Common Ratio]

(1) A is false but R is true

(2) Both A and R are true but R is NOT the correct explanation of A

(3) A is true but R is false

(4) Both A and R are true and R is the correct explanation of A

34. Ten tuning forks are arranged in increasing order of frequency in such a way that any two nearest tuning forks produce 4 beats/sec. The highest frequency is twice of the lowest. Possible highest and the lowest frequencies are

(1) 80 and 40 (2) 100 and 50

(3) 44 and 22 (4) 72 and 36

35. **Assertion (A):** The value of $\sin\theta$ can never be greater than one

Reason (R): In a triangle, perpendicular is always smaller than Hypotenius.

(1) A is false but R is true

(2) Both A and R are true but R is NOT the correct explanation of A

(3) A is true but R is false

(4) Both A and R are true and R is the correct explanation of A

36. Match the following:

Trigonometric function		**Maxima and Minima values**	
(1)	$y = 3\sin\theta + 4\sin\theta$	(A)	$y_{max} = +7$, $y_{min} = +3$
(2)	$y = 4\sin(5\theta)$	(B)	$y_{max} = +7$, $y_{min} = -7$
(3)	$y = 5 - 2\sin\theta$	(C)	$y_{max} = +4$, $y_{min} = -4$
(4)	$y = 6\sin\theta + 8\cos\theta$	(D)	$y_{max} = +10$, $y_{min} = -10$

(1) 1-B; 2-C; 3-A; 4-D

(2) 1-A; 2-B; 3-C; 4-D

(3) 1-C; 2-D; 3-A; 4-B

(4) 1-B; 2-A; 3-C; 4-D

37. The value of sin θ • cos θ will be equal to half the value of sin(2θ) **(True/False)**

38. A uniform conducting wire of length 12a and resistance 'R' is wound up as a current carrying coil in the shape of,

(i) an equilateral triangle of side 'a'.

(ii) a square of side 'a'.

The magnetic dipole moments of the coil in each case respectively are: **[MR*] [2005]**

[Hint: Magnetic Moment = $M = NI$ Area]

(1) $3\,Ia^2$ and Ia^2 (2) $3\,Ia^2$ and $4\,Ia^2$

(3) $4\,Ia^2$ and $3\,Ia^2$ (4) $\sqrt{3}\,Ia^2$ and $3\,Ia^2$

39. A wire of length L metre carrying a current of I ampere is bent in the form of a circle, its magnetic moment is: **[2020-Covid]**

[Hint: $M = IA$]

(1) $I\,\pi\,L^2/4$ Am^2 (2) $2I\,L^2/\pi$ Am^2

(3) $I\,L^2/4\pi$ Am^2 (4) $I\,L^2/4$ Am^2